horological technology, is a noteworthy characteristic. The courses of work in this as well as the other subjects show that sound instruction in the principles and practice of the chief branches of engineering can be obtained at the Institute.

SCIENTIFIC SERIALS.

American Journal of Science, July.—Energy of kathode rays, by W. G. Cady. This is a translation of a paper already published in the *Annalen der Physik*.—Volcanic rocks from Temisconata Lake, Quebec, by H. E. Gregory. The volcanic rocks consist of fine tuff and coarse amygdaloidal conglomerate or breccia. They are interbedded with Niagara sediments, and this helps to determine the time when widespread volcanic activity gave rise to the numerous small areas of tuffs and lavas in the Maine-Quebec region.—Interpretation of mineral analyses, and a criticism of recent articles on tne constitution of tourmaline, by S. L. Penfield. It is safe to assume that the close approximation of atomic ratio to whole numbers constitutes the strongest argument that can be advanced in support of the excellence of an analysis and to correctness of the derived formula. The author criticises the formulæ proposed by Clarke and Tschermak, and maintains that it is definitely proved that the empirical formula of the tourmaline acid is $H_{20}B_2Si_4O_{21}$.—Carboniferous boulders from India, by B. K. Emerson. The author describes and illustrates some striated carboniferous boulders which remove the doubt as to the former existence of a carboniferous glacial period.—The statement of rock analyses, by H. S. Washington. The author proposes a regular system of stating the results of the chemical analysis of rocks. The oxides are to be enumerated in the following succession: SiO_2, Al_2O_3, Fe_2O, FeO, MgO, CaO, Na_2O, K_2O, H_2O, CO_2, and then the rarer oxides, also in definite succession. This will enable the geologist to classify the rocks in a purely chemical system and to pick them out at a glance. They can be advantageously entered upon a card catalogue.—A string alternator, by K. Honda and S. Shimizu. The authors describe a modification of Pupin's string interrupter by means of which a continuous battery current can be converted into an alternating current the frequency of which can be readily varied from 30 to 1000 per second.—Action of light on magnetism, by J. H. Hart. The author failed to obtain the demagnetisation of iron by light acting magnetically like an alternating current, until he adopted the expedient of depositing very fine iron films on glass. He then noticed a small but distinct difference in the magnetic state of the iron according to the plane of polarisation of the incident light.

Bollettino della Società Sismologica Italiana, vol. vi. 1900–1901, N. 1.—Rules and list of fellows (forty-three national and thirteen foreign).—Vesuvian notices (year 1899), by G. Mercalli. A monthly review of the condition of Vesuvius, with sections on the form and state of the crater, the end of the eruptive phase of 1895–1899, the lavic cupola of 1895–1899, the supposed endogenous elevation of the lavic cupola, and the fumaroles of the lavic cupola and fracture.—On the nature of seismic vibrations, by M. P. Rudski (in French). The author contends that superficial, and probably deep-seated, rocks are not isotropic media, and that earthquake waves consist of vibrations which are not entirely longitudinal or entirely transversal.—Notices of earthquakes recorded in Italy (January 1 to March 14, 1896), by A. Cancani, the most important being the Mexican earthquakes of January 14 and 25, the Greek earthquake of January 22, and distant earthquakes on January 6, 22, and March 7.

SOCIETIES AND ACADEMIES.

LONDON.

Royal Society, May 17.—"The Circulation of the Surface Waters of the North Atlantic Ocean." By H. N. Dickson, B.Sc. Communicated by Sir John Murray, K.C.B., F.R.S.

In this paper an attempt is made to investigate the normal circulation of the surface waters of the Atlantic Ocean north of 40° N. lat., and its changes, by means of a series of synoptic charts showing the distribution of temperature and salinity over the area for each month of the two years 1896 and 1897.

The principal conclusions arrived at with reference to the circulation may be summed up as follows:—

(1) The surface waters along the whole of the eastern seaboard of North America north of (about) lat. 30° N., consisting partly of water brought from the equatorial currents by the Gulf Stream, and partly of water brought down by the Labrador current, are drifted eastward across the Atlantic towards south-western Europe, and banked up against the land outside the continental shelf. This continues all the year round, but it is strongest in summer, when the Atlantic anti-cyclone attains its greatest size and intensity; and the proportion of Gulf Stream water is greatest at that season.

(2) The drifts in the northern part of the Atlantic area are under the control of the cyclones crossing it. The circulation set up accordingly reaches its maximum intensity in winter, and almost dies out in summer. In winter the drifts tend to the south eastward from the mouth of Davis Strait, eastward in mid-Atlantic, and north-eastward in the eastern region. In spring and autumn the movement is more easterly over the whole distance, and a larger quantity of water from the Labrador stream is therefore carried eastward.

(3) The water banked up in the manner described in (1) escapes partly downwards, partly southwards, and partly northwards. It occupies the whole of the eastern basin of the North Atlantic, and to the north it extends westward to Davis Strait, being confined below 300 fathoms depth by the ridges connecting Europe, the Faeroes, Iceland, and Greenland. Above that level it escapes northward by a strong current through the Faeroe-Shetland Channel and between Faeroe and Iceland, and by the two branches of the Irminger stream, one west of Iceland the other west of Greenland.

(As it seems desirable that this northerly current should have a distinctive name, it might be well to call it the European stream, and its branches the Norwegian, Irminger, and Greenland streams respectively.)

The strength and volume of the European stream is liable to considerable variation, according to the form and position of the Atlantic anti-cyclone, which causes the amount of banked up water, and the proportions escaping northward and southward, to vary. It is also modified by the strength and direction of the surface drifts in its course. It is, however, always strongest in summer.

(4) The Norwegian stream is by far the largest branch of the European, and it traverses the Norwegian Sea and enters the Arctic Ocean. The warm water thus sent northward melts enormous quantities of ice, and the fresh water derived from the ice moves southward in autumn, chiefly in a wide surface current, between Iceland and Jan Mayen, which may entirely cover other parts of the Norwegian stream. Part of the surface water also comes southward through the Denmark Strait, but the amount is much smaller, probably chiefly because the melting of the ice is slower, and the channel is longer blocked.

The Greenland branch of the European current also causes melting of ice in Davis Strait, but the warm winds from the American continent and the water received from the land are probably more effective in increasing the volume of the Labrador current.

(5) The water from the melted ice is spread over the surface of the North Atlantic during late autumn and winter by the increasing drift circulation, and it is gradually absorbed by mixing with the underlying water.

(6) The circulation described is liable to extensive irregular variations, corresponding to variations in the atmospheric circulation.

May 31.—"Influence of the Temperature of Liquid Hydrogen on Bacteria." By Allan Macfadyen, M.D., and Sydney Rowland, M.A. Communicated by Lord Lister, P.R.S.

In a previous communication we have shown that the temperature of liquid air has no appreciable effect upon the vitality of micro-organisms, even when they were exposed to this temperature for one week (about −190° C.). (*Roy. Soc. Proc.*, February 1; *ibid.*, April 5.)

We have now been able to execute preliminary experiments projected in our last paper as to the effect of a temperature as low as that of liquid hydrogen on bacterial life. As the approximate temperature of the air may be taken as 300° absolute, and liquid air as 80° absolute, hydrogen as 21° absolute, the ratio of these temperatures roughly is respectively as 15 : 4 : 1. In other words, then, the temperature of liquid

© 1900 Nature Publishing Group